A Few Practical Tips to Keep in Mind When Integrating Surveys

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Bearing Reference

Ensure that you are using the correct bearing reference.

If two receivers are being used and one is on "A" and the other is on "B", then the grid bearing is derived from simultaneous GPS observations from point A to B.

If using one receiver in a Real Time Network, then the grid bearing is derived from observed reference points A and B by Real Time Network observations.

When setting Observed Reference Points, measure them at the beginning of the survey and then re-observe them at the end of the survey.

Grid and Ground Coordinates

Do not be tempted to divide the grid coordinate by the combined scale factor to get some pseudo ground coordinate. There is no such thing as a ground UTM coordinate; a UTM coordinate is on the reference plane. If you want to use ground coordinates, then use a local coordinate system with an origin of 5,000, 5,000 and these local coordinates will not be confused and be construed to be UTM coordinates.

Real Time Networks

Work in the Canadian Spatial Reference System (CSRS).

Epoch

Don't forget to state the epoch that you are using. In most cases it will be 1997. In the future, we will use a different epoch and we will have to know which one a plan is referenced to.

Convergence

When retracing a plan that has astronomic bearings, it is nice to be able to quickly calculate the convergence on the difference between the astronomic and grid bearings. Not only does this give a quick check on the observed convergence of a line, it allows you to find one monument and calculate the grid coordinates of another point and have the GPS navigate you to the point. The GPS is a very powerful "bar finder".

The formula is: $\theta = 32.39 L \tan\varphi$

θ = the convergence in seconds of arc

L = the distance in km from the Central Meridian (CM) (CM Easting is 500,000)

φ = the latitude (get this from the raw data in the data collector)

Field Notes

State on the field notes:

You are using grid distances or ground distances

You are using MTM, UTM(ORIG) or UTM (CSRS)

The combined scale factor

If you are using a network, then indicate which one.

Coordinates on the Electronic Version of the Plan

If the electronic version of the plan has grid coordinates, then explain this to your client. The inversed distances between the points will be the shorter grid distances and not the longer ground distances as shown on the plan.

Integration

Integration is simply tying the survey into a coordinate system. We are not amending the rules of evidence; a coordinate will not take precedence over a found monument. A coordinate is simply a form of measurement used to attempt to describe a point.

Observed Reference Point (ORP)

An ORP is a monumented point connected to a coordinate system by measurement, it therefore does not have to be the actual point of observation. It can simply be a monumented point on the survey that is connected to the actual point of observation. The actual point of observation could be on adjacent lands where we have no right to set a monument or even a point set in the ice on a frozen lake.

Accuracy

Remember that there are two definitions of the accuracy that we are trying to obtain

1. The objective absolute (network) accuracy and,

2. The subjective relative (local) accuracy.

Blunders

In order to check for blunders when measuring the coordinates of a point with a GPS, measure the point and then remove the receiver from the point, break the GPS lock and re-observe and have the receiver navigate you back to the point.

Setting out a Point

After you are satisfied with the position that the receiver has navigated you to, then mark this position on the ground with a pin or a nail. Offset this point by two right angled taped distances to two other pins or nails. Set the monument and check and adjust using the taped distances from the two off-set points. Break the GPS lock and have the receiver navigate you back to the set point.

These were some of the ideas and questions that arose during my part of Spiros Pagiatakis's Practical Steps to Integrated Surveys seminars. **Tim Hartley** is a practicing Ontario Land Surveyor. He can be reached at **timothydhartley@gmail.com.**